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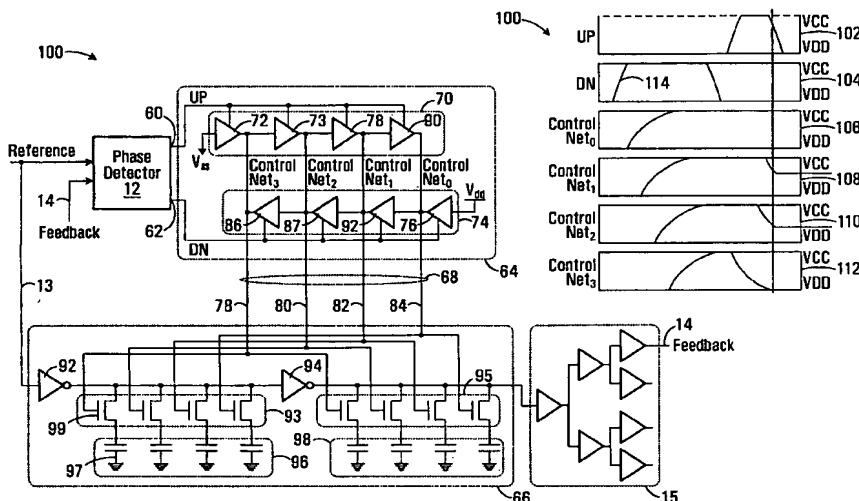
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(54) Title: MIXED-SIGNAL THERMOMETER FILTER, DELAY LOCKED LOOP AND PHASE LOCKED LOOP



(57) Abstract: Circuits for implementing a thermometer code in a mixed-signal fashion are provided. Each of a set of outputs can be digital or analog in a transition region. The mixedsignals can be used to control delay elements in a delay line for application in DLLs or PLL or clock de-skew circuits, or can be used to control voltage controlled oscillators. Two sets of driver elements are connected to the set of mixedsignal outputs and in a first control state, one of the sets drives the mixed-signal outputs sequentially to off states, while in another control state, the other of the sets drives the mixed-signal outputs sequentially to on states. Any mixed-signal that is not completely driven to its on or off state will generate an analog output.